

great value as a practical guide. As such, it takes what is, in some respects, a new departure: it rejects the familiar notion that as storms are mere derangements of the system of winds, they deserve, in a systematic study, nothing more than an incidental notice; and it puts prominently forward the idea that, on the contrary, they ought to be studied in very full detail; because, as it argues, the derangements are rather exaggerations than alterations of the system, and are thus capable of serving as a microscope for the student's clearer instruction. It is an idea which has been well and fully worked out; and with a care and industry which supply the reader with an exhaustless mine of illustration and example.

J. K. L.

MUIR'S "PRINCIPLES OF CHEMISTRY"

Principles of Chemistry. By M. M. Pattison Muir, (Cambridge University Press, 1884.)

DURING the last two decades chemistry has made, possibly, its greatest strides, and has unquestionably drawn to itself a greater following of students in this country than in any previous period. One result of that has been a multiplication of text-books such as perhaps no other science can show. This is only as it should be in the case of a living and progressing science like chemistry. But if one musters the style of text-book produced during this period it becomes painfully doubtful whether they as a whole have kept abreast of the mental capacity which should have been, and undoubtedly has, developed during this period.

Chemistry is certainly a practical science, and that in a very full acceptance of the term; but at the same time it has a history as a practical and especially as a theoretical or mental study second to none, and the unsatisfactory part of the majority of the text-books of modern date is that this growth and development, and the invaluable effect of this as a mental training, have been almost completely ignored.

As mathematical men have been heard to say when going through a course of chemical drudgery, "there seems to be nothing but a lot of isolated facts to learn up." And one cannot be surprised at the remark. The text-books may be roughly divided into two sorts—those of a dictionary character and those intended as an introductory or elementary teacher; the former fulfil their intention, which can scarcely be said of the latter, in which the points of principal theoretical interest are "atomicity" and "atomic and molecular combination," and various ways of writing "formulae."

It is much to be feared that the teaching of the past few years in this country in chemistry has assumed such an intensely "practical" form that philosophical chemistry has been left very much out in the cold. The numerous examinations in which practical work is required has raised up, unfortunately, an army of "test-tubers" and crammers whose theoretical knowledge is of the slenderest. Without in the least wishing to underrate the value of practical work, it does certainly appear, looking only at the chemical literature of the past few years, that theoretical chemistry has to a great extent receded from view in favour of practical, and that of a not very thorough kind.

In the present book Mr. Muir has made up for the lacking in our text-books, and has certainly rendered a real service to the English student who aspires to be something more than a mere test-tuber and writer of graphic formulæ.

As the author informs us, the book is intended for students who already have some elementary acquaintance with the science, and is meant to give "a fairly complete account of the present state of knowledge regarding the principles and general laws of chemistry." And in this the author has certainly succeeded; for it may with certainty be said that we have not a more comprehensive work of the kind in the language. For although it does not pretend to the rank of a Kopp, still it quite fills the place in English chemical literature that Lothar Meyer's "Modernen Chemie" does in the German, which latter work, the author tells us, he has made "free use of."

The subject-matter of the book is necessarily extensive, and has been divided into two main parts—Chemical Statics and Chemical Kinetics. The historical method of treatment adopted cannot fail to be appreciated by the real student who aspires to be something more than a mere recipient of dry facts.

The chapter on Atomic and Molecular Systems and on the Application of Physical Methods to Questions of Chemical Statics, as well as that on Affinity, are condensations from all the most recent works on the subjects, and are, as a rule, clear and concise. The references to originals, &c., &c., are numerous, and the mechanical errors throughout the work are surprisingly few.

The book should be very useful to students training for teachers, and who may not have the advantage of reference to original literature on the numerous subjects treated of.

OUR BOOK SHELF

Eine Weltreise. Plaudereien aus einer Zweijährigen Erdumsegelung von Dr. Hans Meyer. (Leipzig: Verlag des Bibliographischen Instituts, 1885.)

THIS handsome volume is something more than the work of a "globe-trotter," even of a very amusing "globe-trotter." Dr. Meyer sailed down the Danube to Constantinople, thence to Athens, Syria (where he visited Smyrna, Beyrout, Damascus, and Jerusalem), Egypt, and by the Red Sea to Bombay. He then travelled through Northern India to Calcutta, and from Madras through Southern India to Ceylon. The journey in the Far East included Singapore, a considerable portion of Java, the Philippines, Hong Kong, Shanghai, and Japan. Thence he reached the United States, through a large part of which he travelled, Mexico, Cuba, and so back to Europe. The journey was more extensive than the usual modern journey around the globe; Java appears to have been thoroughly visited, but the only place in which the work displays any mark of originality is in the Philippines. The scenes and experiences by the way are described with much liveliness, but soon after his arrival in Manila he made a journey into the northern mountainous regions of Luzon, for the purpose of studying the Igorritos and other tribes having their habitat there. The story of the journey, which occupied about three months, is full of interest, and the ethnology of these tribes is discussed in a special appendix. Prof. Blumentritt, the Austrian scholar, who has devoted many years to the study of the archipelago, especially to the vast Spanish literature of the seventeenth and eighteenth centuries relating to it, comes to the following conclusions on its

ethnography. The autochthonous population of the Philippines, the Negritos, were driven back by two Malay invasions, and are now to be found only in isolated remnants scattered throughout the islands of the archipelago. By the first invasion the Negritos were forced from the coast into the interior, where they remained undisturbed until the second Malay irruption. This drove the first Malay invaders in their turn from the coast, and the descendants of the new comers still occupy the ports and harbours to this day. The Negritos were either destroyed by wars with the first Malays, or completely absorbed by marriage with them, that now no tribes of them are to be found. The Malays of the first invasion came from Borneo, and are found to-day in the mountain districts of Luzon, under various tribal names, such as the Tingianes, Igorrotos, Guinanes, Apayos, Abacas, Calnigas, Gaddanes, &c.; while the second invaders, now known as Tagals, Pampangos, Visayas, Ilocanes, Cagayan, &c., inhabit the coast regions, where they were found by the Spaniards in the third quarter of the sixteenth century. Naturally the various tribes were unable to prevent being influenced by each other, as well as from without, and to this we must attribute similarities in many respects, and especially in religion, which mark the Malays of the whole archipelago. Allowance too has to be made for the influence of the Chinese, perhaps also of the Japanese, on the tribes living on the coast long prior to the Spanish invasion. The inhabitants of the coast, the Malays of the second invasion, for the most part profess Christianity now, and are well known, but the pagans of the interior, the Borneo Malays, who, according to Prof. Blumentritt's theory, formed the first invasion, have never been thoroughly investigated, and this circumstance led Dr. Meyer to spend three months among the Igorrotos. The appendix in which he records his observations is very full. It discusses the name and extent of the Igorrotos, their territory, and its climate, their build, mode of dressing the hair, and tattooing (which is far more elaborate than that of even the Japanese grooms, and is probably the most complicated in the world), their dress, ornaments, weapons, villages, huts, agriculture, and cattle-breeding, food, and drink, domestic utensils, art, tools; customs at birth, and marriage, and death; their priests and religion; head-hunting, war customs, festivals, language, modes of reckoning time and numbers, and their myths and sagas. Finally comes Dr. Virchow's account of an Igoroto skull, and a brief vocabulary. It is this portion of the work which renders it one of scientific interest, and prevents it from being a mere amusing account of the modern grand tour. The numerous illustrations which it contains of the tattooing ornaments, utensils, and the like, add greatly to its value. The Igorrotos are among the disappearing peoples of the earth. They leave the impression of having once possessed a higher culture; their manufactures now are far below those of even half a century ago, and Dr. Meyer thinks that, like every primitive race brought into direct contact with European civilisation, nothing can save them from ultimate extinction.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Molecular Dynamics

I THINK there must be some mistake in Prof. Forbes' report of Sir Wm. Thomson's remarks as quoted in NATURE of last week (p. 461) upon the rate of wave-propagation on Maxwell's

electro-magnetic theory of light. From the end of the last quotation one would suppose that Sir Wm. Thomson intended to convey that the rate of wave-propagation that Maxwell's theory asserted to be the same as that of light, was the rate of propagation of a variation of a current in a conducting wire. Now Sir Wm. Thomson cannot, I am sure, have intended to convey any such mistaken notion. Maxwell carefully guards against any such mistake by pointing out that conduction of electricity is of the nature of diffusion, and not of a wave-propagation, and so has no definite velocity. What Maxwell has calculated is the rate of propagation of disturbances in *non-conductors*, and not in conductors. It is the rate at which the disturbances, produced in the way considered by Sir Wm. Thomson in the preceding part of this quotation, would be propagated by transverse vibrations. Of course, as Sir Wm. Thomson asserts, something analogous to a longitudinal vibration may co-exist with these, but Maxwell's theory shows that a medium which would transmit only transverse vibrations would explain electric and magnetic phenomena.

GEO. FRAS. FITZGERALD

40, Trinity College, Dublin, March 23

[The passage quoted by Mr. Forbes is correctly reported. A more full explanation of this subject will be found in Nichol's "Cyclopædia," second edition, 1860, article, "Electricity, velocity of;" reprinted in vol. ii., art. lxxxi., of my collected mathematical and physical papers.—W. T.]

Civilisation and Eyesight

HAVING read with much interest the recent correspondence in NATURE on this subject, I am forwarding the results of some observations which I recently made to determine the degree of acuteness of vision possessed by the natives of the islands of Bougainville Straits, in the Solomon Group.

I examined the powers of vision of twenty-two individuals who were in all cases either young adults or of an age not much beyond thirty. For this purpose I employed the square test-dots which are used in examining the sight of recruits for the British army, and I obtained the following results:—Two natives could distinguish the dots clearly at 70 feet, one at 67 feet, two at 65 feet, three at 62 feet, four at 60 feet, two at 55 feet, three at 52 feet, four at 50 feet, and one at 35 feet. The conclusion at which I arrived was that 60 feet represented the average distance at which a native could count the dots—a distance rather greater than that at which they should be placed to test the normal powers of vision, viz. 57 feet.

Of these twenty-two natives I came upon only one whose vision seemed at all defective. In this instance—that of a man about thirty years old—the nature of the cause was sufficiently indicated by the prominence of the eyes and the nipping of the lids, especially when the sight was strained by trying to count the test-dots at a distance. The limit of distance at which this man could count the test-dots was 35 feet. The question which presented itself to my mind in this case was, whether a white man who could count the dots at the same distance—viz. 35 feet—would exhibit to the same degree the external signs of myopia. I might put this query into other words, and ask whether, considering the far-seeing powers of these natives, the peculiar external signs of myopia would not appear with a less degree of this defect than with the white man.

Natives of these islands are very quick at perceiving distant objects, such as ships at sea. I was often much impressed by their facility in picking out pigeons and opossums, which were almost concealed in the dense foliage of the trees some 60 or 70 feet overhead. My attention was not attracted by the unusual size of the pupils; the eyes, however, have a soft, fawn-like appearance with but little expression. In conclusion, I may refer to the circumstance that the interiors of their houses are always kept dark, the door being usually the only aperture admitting light. The object is, I believe, to exclude flies and other insects from their dwellings. Coming in from the direct sunlight, I have often had to wait a minute or two before my eyes became accustomed to the change; but the natives do not experience this inconvenience. Some hours of the day they commonly spend in their houses, while at night they use no artificial light except the fitful glare of a wood fire. It would seem probable that the influence of the opposite conditions, presented by the bright sunlight and the darkness of their dwellings, would be found in the increased rapidity of the contraction and dilatation of the pupil with the enlargement, perhaps, of the